

A Novel Low-Cost Dual-Wavelength Precipitation Radar Sensor Network, Phase I

Completed Technology Project (2005 - 2005)



Project Introduction

NASA is committed to measuring precipitation on a global scale. In 1997, NASA launched the Tropical Rain Measuring Mission which carried the first spaceborne precipitation radar (PR). Operating at 13.8 GHz, the PR demonstrated the potential of spaceborne radars to map global precipitation. To improve rainfall estimates, the next generation system being proposed for the NASA Global Precipitation Mission is a dual-wavelength (Ku/Ka-band) precipitation radar (DPR). Operating at Ku and Ka-band, it will yield additional information on the drop size distribution (DSD). Advanced ground-based Ku/Ka-band DPR systems are needed to develop and validate the retrieval algorithms that will be used by GPM. This proposed Phase I effort will investigate the required innovations to design and construct a novel, low-cost, scanning, dual-polarized DPR sensor and sensor network. The focus will be on developing a low-cost ruggedized compact antenna, transceiver, power amplifier and real-time processing and communication subsystems. This advanced DPR sensor network will provide unprecedented spatial/temporal sampling and coverage and multiple methods to determine DSD: polarization, differential extinction, multi-look radar measurements of extinction. As a sensor network, limitations due to earth curvature, topography and ground clutter that affect the existing weather radar infrastructure can be overcome.

Anticipated Benefits

The proposed low-cost Ku/Ka-band DPR sensor and sensor network will enable many research institutions, such as universities, government and private sector research labs, to advance their efforts in the areas of precipitation studies, weather forecasting and long-term climate forecasting while fitting within their budgets. With billions of dollars being spent on weather products and forecasting, this unique and low-cost sensor network will improve local QPE measurements and forecasts. Initial market research shows a strong need for such a system and RSS plans to aggressively pursue this opportunity. The proposed novel low-cost scanning DPR sensor network system will support GPM efforts by providing an essential and unprecedented data set to validate and improve GPM retrieval algorithms and aide in calibration/validation studies. Deployed at the GPM super sites and elsewhere, it will provide direct and statistical comparisons with horizontal scanning radars, such as S-Pol, Chill and other systems, such that the new data from the DPR radars, either stand-alone or in networked configuration, can augment that of the established lower frequency radars.



A Novel Low-Cost Dual-Wavelength Precipitation Radar Sensor Network, Phase I

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Organizational Responsibility	1
Primary U.S. Work Locations and Key Partners	2
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

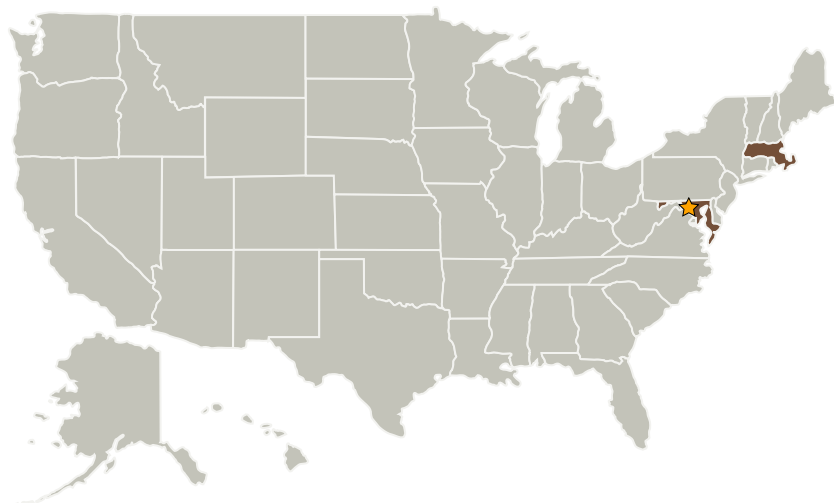
Small Business Innovation Research/Small Business Tech Transfer

A Novel Low-Cost Dual-Wavelength Precipitation Radar Sensor Network, Phase I

Completed Technology Project (2005 - 2005)



Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Remote Sensing Solutions, Inc.	Supporting Organization	Industry	Barnstable, Massachusetts

Primary U.S. Work Locations

Maryland	Massachusetts
----------	---------------

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Steven W Bidwell

Principal Investigator:

James R Carswell

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves